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(54)【発明の名称】　高圧放電灯点灯方法および装置

(57)【要約】
電圧供給源に接続する入力端子（Ｋ１，Ｋ２）と、これら入力端子に結合され、交流ランプ電流を高圧放電灯に供給する手段とを具える高圧放電灯点灯回路を提供する。本発明によれば、この高圧放電灯点灯回路はランプ電流の各半周期に電流パルスを発生させる手段III をも具え、この電流パルスはその極性を前記ランプ電流の極性と同一にするとともにこの電流パルスをその発生した半周期の所定数分の１の後の部分でこのランプ電流に重畳する。これがため、ランプの作動中放電アークのフリッカを充分に抑圧することができる。

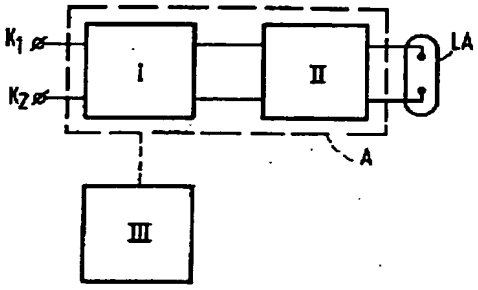

FIG.1

８．前記ランプ電流の周波数は50Ｈｚ－500 Ｈｚの範囲から選択し、電流パルスの平均振幅およびランプ電流の平均振幅間の比を0.6 乃至２の範囲とし、電流パルスの持続期間およびランプ電流の半周期間の比を0.05-0.15 の範囲とすることを特徴とする請求項１乃至７の何れかの項に記載の高圧放電灯点灯回路。

９．前記電流パによって高圧放電灯に供給されるエネルギーの量を半周期中にランプ電流により高圧放電灯に供給されるエネルギーの量の５％乃至15％とすることを特徴とする請求項１乃至８の何れかの項に記載の高圧放電灯点灯回路。

10．高圧放電灯点灯回路は高圧放電灯によって消費される電力の所望量の目安となる信号を発生する手段を設けた電力制御ループを具え、電流パルス発生手段は前記信号を調整する手段を具えることを特徴とする請求項１乃至９の何れかの項に記載の高圧放電灯点灯回路。

11．前記転流器は全波ブリッジ回路を具えることを特徴とする請求項５，６または７に記載の高圧放電灯点灯回路。

温度がランプ電流の一周期中全体に亘って強く変化して放電アークが陽極フェーズ中電極の表面の種々の箇所から発生するようになる。しかし；陰極フェーズでは同一電極の表面での放電アークの発生はこれら種々の箇所のうちの１箇所のみに限定されるようになる。この挙動は、高圧放電灯を投影テレビジョンのような光学的用途に用いる場合には、特に許容し得ないものとなる。かかる用途では電極間の距離は極めて短くする必要がある。その理由は放電アークを点光源に近づける必要があるからである。しかし、かように電極間の距離を極めて短くすることにより、放電アークが交互の陰極フェーズ中電極の異なる箇所から発生するため全放電アーク中不安定となり、従ってフリッカが極めて強くなる。

発明の概要

本発明の目的は作動中ランプのフリッカを著しく抑圧するようにした高圧放電灯点灯方法および回路を提供せんとするにある。

本発明高圧放電灯点灯方法は交流ランプ電流を高圧放電灯に供給して高圧放電灯を点灯するに当たり、ランプ電流の半周期の所定数分の１で電流パルスを発生させ、この電流パルスの極性を前記ランプ電流の極性と同一にするとともにこの電流パルスをその発生した半周期の後の部分でこのランプ電流に重畳することを特徴とする。

また、本発明は電圧供給源に接続する入力端子と、これら入力端子に結合され、交流ランプ電流を高圧放電灯に供給する手段とを具える高圧放電灯点灯回路において、ランプ電流の半周期の所定数分の１で電流パルスを発生させる手段IIIをさらに具え、この電流パルスの極性を前記ランプ電流の極性と同一にするとともにこの電流パルスをその発生した半周期の後の部分でこのランプ電流に重畳することを特徴とする。

ランプを流れる電流の全量は電流パルスによってランプ電流の半周期の所定数分の１の終端で増大するため、電極の温度は著しく高い値に上昇する。この高温度のため、放電アークの安定性が増大する。その理由は放電アークが各陰極フェーズで電極の同一箇所から発生するからである。本発明高圧放電灯点灯方法および／または高圧放電灯点灯回路を用いる場合には、高圧放電灯の点灯時にフリッ

れば、交流ランプ電流を発生するために用いられる手段を用いて電流パルスを発生させることができる。

本発明高圧放電灯点灯回路の好適な例では、高圧放電灯点灯回路は高圧放電灯によって消費される電力の所望量の目安となる信号を発生する手段を設けた電力制御ループを具え、電流パルス発生手段は前記信号を調整する手段を具えるようにする。

さらに他の好適な例では、前記転流器は全波ブリッジ回路を具えるようにする。

図面の簡単な説明

図１は本発明高圧放電灯点灯回路の一例を示すブロック回路図、

図２は図１のブロック図の詳細な回路図、

図３は図１の高圧放電灯点灯回路の一部分をさらに詳細に示す回路図、

図４は図２の詳細な回路における種々の箇所のランプ点灯中の電流および電圧の形状を示す特性図である。

発明を実施するための最良の形態

図１において、Ｋ１およびＫ２は供給電圧を印加する電圧供給源に接続する入力端子である。入力端子Ｋ１およびＫ２に結合されたブロックＩは直流電流を発生する手段である。手段Ｉの出力端子は転流器IIの各入力端子に接続する。転流器IIの出力端子は高圧放電灯Ｌａに接続する。手段Ｉおよび手段IIは双方で高圧放電灯に交流ランプ電流を供給する手段Ａを構成する。III はランプ電流の各半周期１つの電流パルスを発生する手段である。この目的のために手段III は図１に点線で示されるように手段Ａに接続する。

図１に示す高圧放電灯点灯回路の作動は次の通りである。

入力端子Ｋ１およびＫ２を電圧供給源の極に接続すると、手段Ｉは電圧供給源によって供給された供給電圧から直流供給電流を発生する。転流器IIによってこの直流供給電流を交流ランプ電流に変換する。ランプ電流の各半周期では、手段III によって、極性がランプ電流の極性に等しく、各半周期の後の部分でランプ電流に重畳される電流パルスを発生する。ランプ電流およびこれに重畳される電流パルスの双方は高圧放電灯Ｌａに供給される。

Ｒ１の一側および誘導素子Ｌの他側を回路部分ＣＰＩの各入力端子に接続する。回路部分ＣＰＩの出力端子を比較器ＣＯＭＰの第１入力端子に接続する。比較器ＣＯＭＰの他の入力端子を抵抗Ｒ３の一側およびポテンショメータＲ２の一側に接続する。ポテンショメータＲ２の他側を端子Ｋ３に接続する。抵抗Ｒ３の他側をコンデンサＣ１の他側に接続する。抵抗Ｒ３をスイッチング素子Ｓ６によって分路する。比較器ＣＯＭＰの出力端子を駆動回路ＤＣ１の入力端子に接続する。回路部分ＣＰIIの第１出力端子をスイッチング素子Ｓ６の制御電極に接続する。回路部分ＣＰIIの２つの他の出力端子ＤおよびＥを駆動回路ＤＣ２およびＤＣ３の各入力端子に接続する。

図２に示す高圧放電灯点灯回路の作動は次の通りである。

入力端子Ｋ１およびＫ２を低周波数の交流供給電圧を供給する電圧供給源の両極に接続する場合には、この低周波数の交流供給電圧を整流ブリッジＲＢにより整流してコンデンサＣ１に両端間に存在する直流電圧の変換する。駆動回路ＤＣ１、スイッチング素子Ｓ１、ダイオードＤ１および誘導素子Ｌはその全体で直流－直流変換器、特にダウンコンバータとして機能する。このダウンコンバータによってコンデンサＣ１の両端間に存在する直流電圧を直流供給電流に変換する。コンデンサＣ２はバッファコンデンサとして作用する。スイッチング素子Ｓ２およびＳ５とスイッチング素子Ｓ３およびＳ４とは駆動回路ＤＣ２およびＤＣ３によって交互に導通状態および非導通状態とする。これがため、直流供給電流は交流ランプ電流に変換される。回路部分ＣＰＩの入力端子に存在する電圧はランプを流れる電流および転流器の供給電圧の振幅の目安となる。回路分路ＣＰＩによってこれら２つの電圧からランプで消費された電力の目安となる信号を発生する。この信号は比較器ＣＯＭＰの第１入力端子に存在する。ランプの作動中端子Ｋ３にはほぼ一定の電圧が流れる。この電圧は図２に示さない手段によって発生する。ポテンショメータＲ２、抵抗Ｒ３およびスイッチング素子Ｓ６によって、比較器ＣＯＭＰの第２入力端子に存在し、ランプで消費される電力の所望量の目安となる基準電圧を発生する。比較器ＣＯＭＰの出力信号に依存して、駆動回路ＤＣ１によって比較器により発生した高周波パルスのパルス幅を制御する。ランプ

ＣＰＶの出力端子ＤおよびＥに存在するデジタル信号の時間応動性は図４に曲線ＤおよびＥでそれぞれ示す。出力端子Ｃを図２のスイッチング素子Ｓ６の制御電極に接続するため、出力端子Ｄのデジタル信号が高レベルにある際はスイッチング素子Ｓ６が導通状態となる。従って、電流パルスの持続時間は出力端子Ｄのデジタル信号が高レベルにある時間間隔に等しくなる。図４の曲線Ｉは、かかるランプが本発明高圧放電灯点灯回路によって作動する場合における高圧放電灯を流れる電流の総量の振幅の時間依存性を示す。曲線Ｉはランプ電流をほぼ正弦波状の交流電流として示すが、電流パルスはほぼ矩形状である。ランプ電流および電流パルスの双方の形状は本発明の要旨ではない。実際上、電流パルスの形状は例えば正弦波状、三角波状または指数関数状とすることができる。

図２に示す高圧放電灯点灯回路の特定の例はドイツ国特許3813412 に記載された高圧放電灯の作動に用いられる。このランプはその公称電力消費が100 Ｗで、電極距離が1.4 ｍｍである。平均振幅が0.9 Ａの電流パルスを各半周期の後の８％中（平均振幅が1.1 Ａで交番周波数が９０Ｈｚの）ランプ電流に重畳する場合にはフリッカを充分抑圧することができた。

【図１】

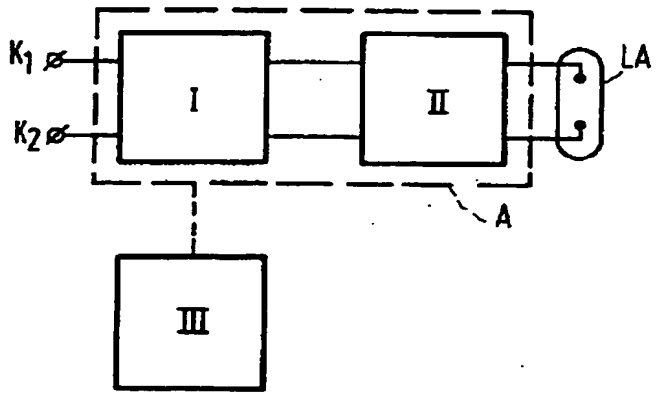

FIG.1

【図２】

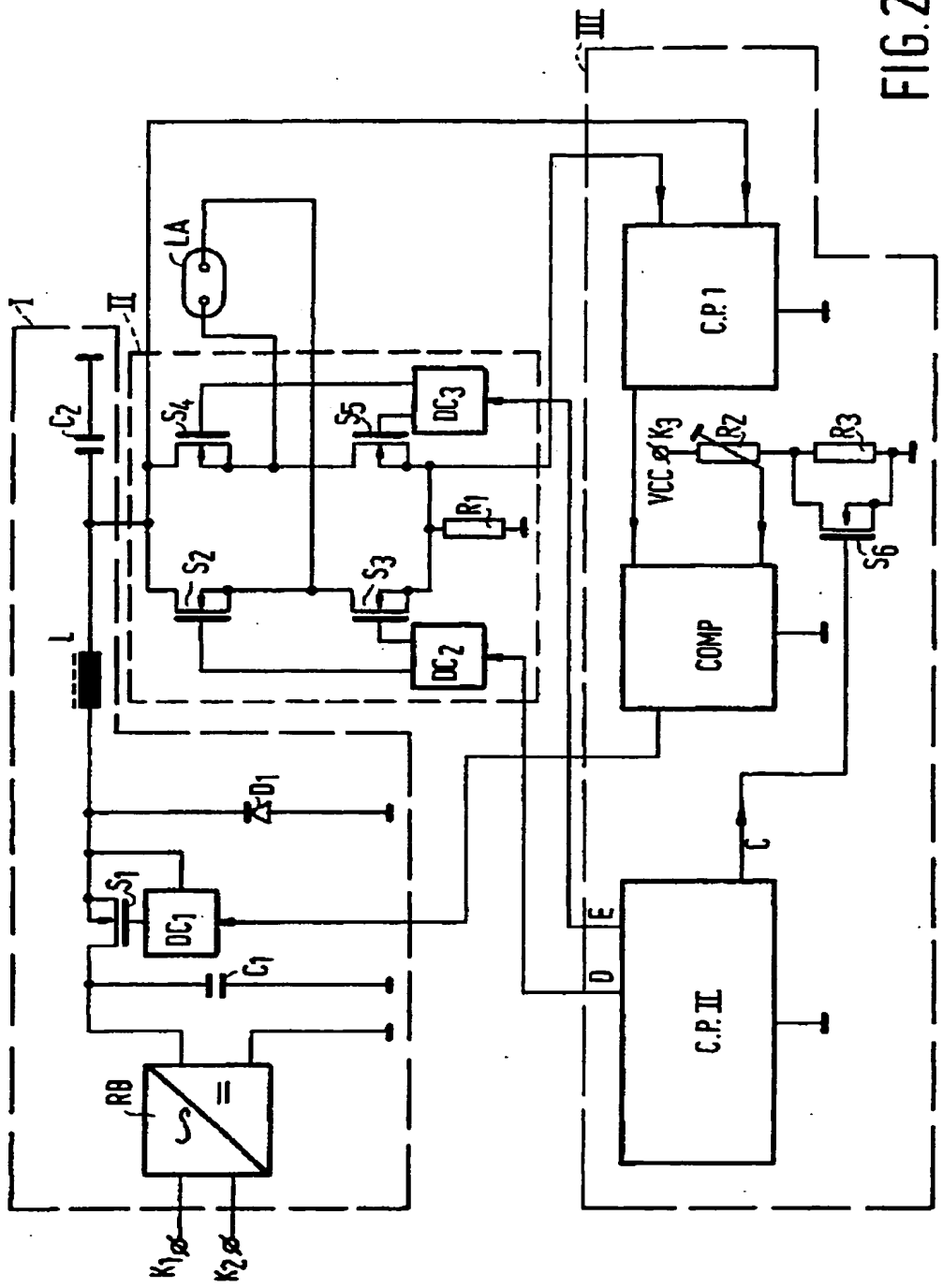
FIG.2
III
I
II
LA
C2
S4
S5
DC3
R1
S2
S3
DC2
L
D1
S1
DC1
C1
RB
K1ø
K2ø
C.P.1
VCC ø K3
R2
R3
S6
COMP
C
E
D
C.P.II

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB 95/00392

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A2- 0389847	03/10/90	AT-T- 118666	15/03/95
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		CN-B- 1024979	08/06/94
		CN-A- 1045677	26/09/90
		DE-D- 59008453	00/00/00
		ES-T- 2068266	16/04/95
		JP-A- 3173347	26/07/91
		US-A- 5070276	03/12/91
WO-A1- 9008399	26/07/90	DE-A,C- 4001526	02/08/90
		DE-D,T- 68920155	11/05/95
		EP-A,B- 0454665	06/11/91
US-A- 5130605	14/07/92	JP-A- 4212258	03/08/92

METHOD AND CIRCUIT ARRANGEMENT FOR OPERATING A HIGH PRESSURE DISCHARGE LAMP

Patent number: WO9535645
Publication date: 1995-12-28
Inventor: DERRA GUNTHER HANS; FISCHER HANNS ERNST; GANSER HANS GUENTHER; MONCH HOLGER
Applicant: PHILIPS ELECTRONICS NV (NL); PHILIPS NORDEN AB (SE)
Classification:
- international: ***H05B41/288; H05B41/292;*** **H05B41/28;** (IPC1-7): H05B41/231
- european: H05B41/288K4L; H05B41/292L
Application number: WO1995IB00392 19950522
Priority number(s): EP19940201784 19940622

Also published as:
US5608294 (A
CN1155368 (C
CA2193680 (C

Cited documents:
EP0389847
WO9008399
US5130605

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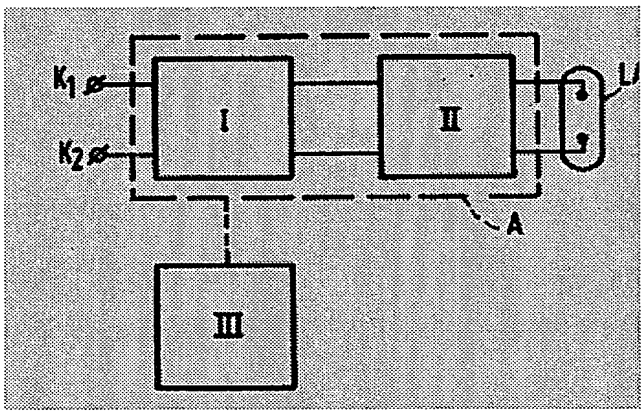
Abstract of **WO9535645**

The invention relates to a circuit arrangement for operating a high pressure discharge lamp comprising input terminals (K1, K2) for connection to a supply voltage source, and means, coupled to the input terminals, for supplying an alternating lamp current to the high pressure discharge lamp. According to the invention, the circuit arrangement also comprises means III for generating a current pulse in each half period of the lamp current, said current pulse having the same polarity as the lamp current and being superimposed on the lamp current in the latter part of a predetermined fraction of the half periods of the lamp current. As a result, flickering of the discharge arc during lamp operation is substantially suppressed.



* NOTICES *

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CLAIMS

[Claim(s)]
1. High-pressure electric-discharge lamp lighting approach characterized by superimposing this current pulse on this lamp current in part after that half period that occurred while in supplying alternating current lamp current to high-pressure electric-discharge lamp, and turning on high-pressure electric-discharge lamp generating current pulse in 1 for predetermined number of half period of lamp current and making polarity of this current pulse the same as that of polarity of said lamp current.
2. Said current pulse is the high-pressure electric-discharge lamp lighting approach according to claim 1 characterized by making it make it generate at each half period of a lamp current.
3. In High-Pressure Electric-discharge Lamp Lighting Circuit Equipped with Input Terminal (K1, K2) Linked to Electrical-Potential-Difference Source of Supply, and Means to be Combined with These Input Terminals and to Supply Alternating Current Lamp Current to High-Pressure Electric-discharge Lamp A means III to generate a current pulse in 1 for a predetermined number of the half period of a lamp current It has further. The high-pressure electric-discharge lamp lighting circuit characterized by superimposing this current pulse on this lamp current in the part after that half period that occurred while making the polarity of this current pulse the same as that of the polarity of said lamp current.
4. Said current pulse generating means III High-pressure electric-discharge lamp lighting circuit according to claim 3 characterized by carrying out current pulse generating at each half period of a lamp current.
5. A means to supply said alternating current lamp current to a high-pressure electric-discharge lamp is a high-pressure electric-discharge lamp lighting circuit according to claim 3 or 4 characterized by having a means I to generate direct-current supply current from the supply voltage which is combined with said input terminal and supplied by said electrical-potential-difference source of supply, and the commutation machine II which changes supply current into an alternating current lamp current.
6. a means to generate direct-current supply current -- lamp lighting -- the crown -- the high-pressure electric-discharge lamp lighting circuit according to claim 5 characterized by having the DC to DC converter which prepared the switching element which operates on a frequency, and a means to generate a current pulse and to adjust the duty cycle of said switching element.
7. a means to generate direct-current supply current -- lamp lighting -- the crown -- the high-pressure electric-discharge lamp lighting circuit according to claim 5 or 6 characterized by having the DC to DC converter which prepared the switching element which operates on a frequency, and a means to generate a current pulse and to adjust the switching frequency of said switching element.
8. the frequency of said lamp current -- from the range of 50Hz-500 Hz -- choosing -- the ratio between the mean amplitude of a current pulse, and the mean amplitude of a lamp current -- 0.6 or -- the range of 2 -- carrying out -- the ratio between the duration of a current pulse, and the half period of a lamp current -- 0.05-0.15 High-pressure electric-discharge lamp lighting circuit given in claim 1 characterized by considering as the range thru/or which term of 7.
9. High-pressure electric-discharge lamp lighting circuit given in claim 1 characterized by considering as 5% of amount of energy to which amount of energy supplied to high-pressure electric-discharge lamp by

said current PA is supplied by high-pressure electric-discharge lamp according to lamp current during half period, and 15% thru/or which term of 8.
10. It is a high-pressure electric-discharge lamp lighting circuit given in claim 1 characterized by equipping a high-pressure electric-discharge lamp lighting circuit with the power control loop which established a means to generate the signal used as the standard of the amount of requests of the power consumed by the high-pressure electric-discharge lamp, and equipping a current pulse generating means with a means to adjust said signal thru/or which term of 9.
11. Said commutation machine is a high-pressure electric-discharge lamp lighting circuit according to claim 5, 6, or 7 characterized by having a full wave bridge circuit.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
The high-pressure electric-discharge lamp lighting approach and technical field of equipment invention
This invention relates to the approach of supplying an alternating current lamp current to a high-pressure electric-discharge lamp, and turning on a high-pressure electric-discharge lamp.
Moreover, it is combined with the input terminal (K1, K2) linked to an electrical-potential-difference source of supply, and these input terminals, and this invention relates to a high-pressure electric-discharge lamp lighting circuit equipped with a means to supply an alternating current lamp current to a high-pressure electric-discharge lamp.
background of invention this seed high-pressure electric-discharge lamp lighting approach and circuit -- United States patent 4,485,434th from -- it is known. In carrying out alternating current actuation of the high-pressure electric-discharge lamp with the alternating current lamp current of a low frequency, while preventing that the current of a high-pressure electric-discharge lamp (a lamp is called below) is eaten away quickly, it is known that a lamp can be made to turn on at comparatively high effectiveness.
The problem about lighting of this seed lamp is that the discharge arc very near the electrode becomes unstable depending on electrode temperature and the condition of an electrode surface. The reason is that the origin of a discharge arc jumps at the following spot from a spot with an electrode surface. When an electrode surface is too cold, immediately near the electrode, it is very thin, therefore the origin of an electrode surface is overheated, and, thereby, a discharge arc comes to produce a minute pike. If the origin of a discharge arc jumps among these minute pikes during lighting actuation, a flicker will arise in a high-pressure electric-discharge lamp. This flicker is produced also when electrode temperature is too high. Under this condition, an electrode material displaces continuously, evaporates and causes the instability of a discharge arc. In operating a high-pressure electric-discharge lamp by alternating current, each electrode of a lamp functions as an anode plate as cathode alternately [of a lamp current / sequential] with during a half period.
It can be said that the electrode in these half periods is in a cathode phase and an anode plate phase, respectively. The electrode material removed from an electrode in an anode plate phase returns to an electrode as an ionic current in a cathode phase. These migration processes complete the behavior of the electrode temperature in a round term of a lamp current. Electrode temperature dependence [in / in the time dependency of electrode temperature / in / in the reason / an anode plate phase / a cathode phase] is because it is different. This accumulates, electrode temperature continues during [of a lamp current / whole] a round term, changes strongly, and a discharge arc comes to occur from the various parts of the front face of the electrode in an anode plate phase. However, in a cathode phase, generating of the discharge arc in the front face of the same electrode comes to be limited only to one in the part of these versatility. This behavior cannot be permitted especially when using a high-pressure electric-discharge lamp for an optical application like projection television. It is necessary to shorten inter-electrode distance extremely for this application. The reason is that it is necessary to bring a discharge arc close to the point light source. however, ** -- by shortening inter-electrode distance extremely like, since a discharge arc occurs from the part where the mutual electrodes in a cathode phase differ, it becomes

unstable among [all] a discharge arc, therefore a flicker becomes very strong.
Outline of invention The purpose of this invention is to use as an offer plug the high-pressure electric-discharge lamp lighting approach and circuit which oppressed the flicker of a lamp remarkably during actuation.
It is characterized by this invention high-pressure electric-discharge lamp lighting approach superimposing this current pulse on this lamp current in the part after that half period that occurred while in supplying an alternating current lamp current to a high-pressure electric-discharge lamp, and turning on a high-pressure electric-discharge lamp it generates a current pulse in 1 for a predetermined number of the half period of a lamp current and makes the polarity of this current pulse the same as that of the polarity of said lamp current.
Moreover, it is combined with the input terminal linked to an electrical-potential-difference source of supply, and these input terminals, and this invention is set in a high-pressure electric-discharge lamp lighting circuit equipped with a means to supply an alternating current lamp current to a high-pressure electric-discharge lamp. A means III to generate a current pulse in 1 for a predetermined number of the half period of a lamp current While having further and making the polarity of this current pulse the same as that of the polarity of said lamp current, it is characterized by superimposing this current pulse on this lamp current in the part after that half period that occurred.
Since the whole quantity of a current which flows a lamp increases by the current pulse at the termination of 1 for a predetermined number of the half period of a lamp current, the temperature of an electrode rises to a remarkable high value. The stability of a discharge arc increases for this high temperature. The reason is that a discharge arc occurs from the same part of an electrode in each cathode phase. When this invention high-pressure electric-discharge lamp lighting approach and/or a high-pressure electric-discharge lamp lighting circuit were used, it confirmed that a flicker could be remarkably oppressed at the time of lighting of a high-pressure electric-discharge lamp.
Furthermore, in using a high-pressure electric-discharge lamp as a metal halogenide lamp, according to the increase ion current generated by the current pulse, deposition of the metal contained in the lamp plasma to the front-face top of an electrode increases, and, thereby, the work function of an electrode falls.
It generates periodically (for example, every [every 3rd half period of a lamp current and the 5th half period (every)]), or a current pulse emits a current pulse to a burst (for example, the current pulse of the piece in five continuous half periods is generated, and the following current pulse in five continuous half periods is not generated, but the current pulse of the following piece in five continuous half periods is generated further).
When a current pulse was generated for every half period of a lamp current, the very good result was able to be obtained.
Moreover, when the amplitude of a current pulse was high, it confirmed that a period for oppression of a flicker to attain the same result could be shortened. It depends for the optimal amplitude and optimal period of a current pulse on the class of lamp, and the dimension of an electrode. the frequency of said lamp current -- from the range of 50Hz-500 Hz -- choosing -- the ratio between the mean amplitude of a current pulse, and the mean amplitude of a lamp current -- 0.6 or -- the range of 2 -- carrying out -- the ratio between the duration of a current pulse, and the half period of a lamp current -- 0.05-0.15 The good result was able to be obtained when considering as the range. The mean amplitude of a lamp current is the average of the amplitude of the lamp current in a half period. The mean amplitude of a current pulse is the average of the amplitude of the current pulse in the duration of a current pulse. It is suitable for the amount of the energy supplied to a high-pressure electric-discharge lamp by said current pulse to consider as 5% of the amount of the energy supplied to a high-pressure electric-discharge lamp by the lamp current during a half period and 15%.
It is combined with said input terminal, and a means to supply said alternating current lamp current to a high-pressure electric-discharge lamp can manufacture this invention high-pressure electric-discharge lamp lighting circuit comparatively simply and at a low price, when it has a means to generate direct-current supply current from the supply voltage supplied by said electrical-potential-difference source of

supply, and the commutation machine II which changes supply current into an alternating current lamp current. moreover, a means to generate direct-current supply current -- lamp lighting -- the crown -- it constitutes from a DC to DC converter which prepared the switching element which operates on a frequency, and a means to generate a current pulse and to adjust the duty cycle or switching frequency of said switching element. If it is made Mr. **, a current pulse can be generated using the means used since an alternating current lamp current is generated.
In the suitable example of this invention high-pressure electric-discharge lamp lighting circuit, a high-pressure electric-discharge lamp lighting circuit is equipped with the power control loop which established a means to generate the signal used as the standard of the amount of requests of the power consumed by the high-pressure electric-discharge lamp, and a current pulse generating means is equipped with a means to adjust said signal.
Furthermore in other suitable examples, said commutation machine is equipped with a full wave bridge circuit.
Easy explanation of a drawing Drawing 1 is the block circuit diagram showing an example of this invention high-pressure electric-discharge lamp lighting circuit. Drawing 2 is the detailed circuit diagram of the block diagram of drawing 1 . Drawing 3 is the circuit diagram showing further a part of high-pressure electric-discharge lamp lighting circuit of drawing 1 in a detail. Drawing 4 is the property Fig. showing the current under lamp lighting of the various parts in the detailed circuit of drawing 2 , and the configuration of an electrical potential difference.
The best gestalt for inventing In drawing 1 , K1 and K2 are the input terminals linked to the electrical-potential-difference source of supply which impresses supply voltage. The block I combined with input terminals K1 and K2 is a means to generate a direct current. The output terminal of Means I is connected to each input terminal of the commutation machine II. The output terminal of the commutation machine II is connected to the high-pressure electric-discharge lamp La. Means I and Means II constitute a means A to supply an alternating current lamp current to a high-pressure electric-discharge lamp on both sides. III It is a means to generate the current pulse of each one half period of a lamp current. It is Means III because of this purpose. As shown to drawing 1 by the dotted line, it connects with Means A.
The actuation of the high-pressure electric-discharge lamp lighting circuit shown in drawing 1 is as follows.
If input terminals K1 and K2 are connected to the pole of an electrical-potential-difference source of supply, Means I will generate direct-current supply current from the supply voltage supplied by the electrical-potential-difference source of supply. This direct-current supply current is changed into an alternating current lamp current with the commutation vessel II. At each half period of a lamp current, it is Means III. A polarity is equal to the polarity of a lamp current, and the current pulse on which a lamp current is overlapped in the part after each half period is generated. The both sides of the current pulse on which a lamp current and this are overlapped are supplied to the high-pressure electric-discharge lamp La.
In drawing 2 , the rectification bridge RB, capacitors C1 and C2, the drive circuit DC 1, a switching element S1, diode D1, and the induction component L constitute a means I to generate a direct current. This example constitutes the commutation machine II from switching elements S2 and S3, S4 and S5, the drive circuits DC2 and DC3, and resistance R1. Means III An additional means to generate an almost fixed electrical potential difference for a terminal K3 during the circuit part CPI and CPII, Comparator COMP, a switching element S6, a terminal K3, a potentiometer R2, resistance R3, and lamp lighting constitutes. The circuit of this addition is not illustrated. Input terminals K1 and K2 are input terminals for connecting with the electrical-potential-difference source of supply which supplies AC supply voltage of low frequency. These input terminals K1 and K2 are connected to each input terminal of the rectification bridge RB. The 1st output terminal of the rectification bridge RB is connected to 1 side of a capacitor C1. A side besides this capacitor C1 is connected to the 2nd output terminal of the rectification bridge RB. Moreover, 1 side of a capacitor C1 is connected to the 1st main electrode of a switching element S1. The control electrode of a switching element S1 is connected to the output terminal of the drive circuit DC 1. While connecting other control electrodes of a switching element S1 to the cathode

of diode D1, it connects with the input terminal of the drive circuit DC 1. The anode plate of diode D1 is connected to a side besides a capacitor C1. The cathode of diode D1 is connected also to 1 side of the induction component L. A side besides the induction component L is connected to the 1st main electrode of a switching element S2, and the 1st main electrode of switching element S4. Moreover, a side besides the induction component L is connected to 1 side of a capacitor C2. A side besides a capacitor C2 is connected to a side besides a capacitor C1. While connecting other main electrodes of a switching element S2 to the 1st main electrode of a switching element S3, other main electrodes of switching element S4 are connected to the 1st main electrode of a switching element S5. Other main electrodes of a switching element S3 and other main electrodes of a switching element S5 are connected to the 1 side of low frequency R1, and a side besides this low frequency R1 is connected to a side besides a capacitor C1. Other main electrodes of switching S2 and switching element S4 are connected with the high-pressure electric-discharge lamp La (inside of an operating state).
The control electrode of a switching element S2 and the control electrode of a switching element S3 are connected to each output terminal of the drive circuit DC 2. The control electrode of switching element S4 and the control electrode of a switching element S5 are connected to each output terminal of the drive circuit DC 3. 1 of resistance R1 and a side besides the induction component L is connected to each input terminal of the circuit part CPI.
The output terminal of the circuit part CPI is connected to the 1st input terminal of Comparator COMP. Other input terminals of Comparator COMP are connected to the 1 of resistance R3, and 1 side of a potentiometer R2. A side besides a potentiometer R2 is connected to a terminal K3. A side besides resistance R3 is connected to a side besides a capacitor C1. Resistance R3 is shunted by the switching element S6. The output terminal of Comparator COMP is connected to the input terminal of the drive circuit DC 1.
The 1st output terminal of the circuit part CPII is connected to the control electrode of a switching element S6.
Other two output terminals D and E of the circuit part CPII are connected to each input terminal of the drive circuits DC2 and DC3.
The actuation of the high-pressure electric-discharge lamp lighting circuit shown in drawing 2 is as follows.
the direct current voltage which rectifies the alternating current supply voltage of this low frequency with the rectification bridge RB, and exists in a capacitor C1 among both ends in connecting input terminals K1 and K2 to the two poles of the electrical-potential-difference source of supply which supplies the alternating current supply voltage of low frequency -- changing . The drive circuit DC 1, a switching element S1, diode D1, and the induction component L function as a DC to DC converter, especially a down converter by the whole. The direct current voltage which exists among the both ends of a capacitor C1 with this down converter is changed into direct-current supply current.
A capacitor C2 acts as a buffer capacitor. Switching elements S2 and S5, a switching element S3, and S4 are taken as switch-on and non-switch-on by turns by the drive circuits DC2 and DC3. This accumulates and direct-current supply current is changed into an alternating current lamp current. The electrical potential difference which exists in the input terminal of the circuit part CPI serves as a standard of the amplitude of the supply voltage of the current and commutation machine which flow a lamp. The signal which serves as a standard of the power consumed with the lamp from these two electrical potential differences by the circuit shunt CPI is generated. This signal exists in the 1st input terminal of Comparator COMP. For a terminal K3, an almost fixed electrical potential difference flows during actuation of a lamp. This electrical potential difference is generated with the means which is not shown in drawing 2 . By the potentiometer R2, resistance R3, and the switching element S6, it exists in the 2nd input terminal of Comparator COMP, and the reference voltage used as the standard of the amount of requests of the power consumed with a lamp is generated. Depending on the output signal of Comparator COMP, the pulse width of the RF pulse generated by the comparator is controlled by the drive circuit DC 1. You make it flow through the first switching element S6 in a part of each half period of a lamp current. The reference voltage which this accumulates and exists in the 2nd input terminal of

Comparator COMP is comparatively low. Therefore, all the amounts of the power consumed with the amplitude and lamp of a current which flow the pulse width of the RF pulse generated by the drive circuit DC 1 and a lamp presuppose un-flowing a switching element S6 by the circuit part CPII in the part after each half period of the lamp current used as a comparatively low value. Thereby, the amount of the power which the duty cycle of the driving signal which increased, consequently was generated by the drive circuit DC 1 increases, and reference voltage is superimposed on a current pulse by the lamp current, and is consumed with a lamp increases.
The circuit part the number of drawing 3 is [part] three: It is CPIII. Or the circuit part CPII which consists of CPV is shown.
CPIII It is the digital circuit which has the 1st output terminal A and the 2nd output terminal B.
The 1st digital signal which has the same frequency as a lamp current during actuation of a lamp exists in an output terminal. Circuit part CPIII The 2nd digital signal which also has the frequency of a lamp current exists in the 2nd output terminal. Curves A and B show the time amount corresponding movement nature of both signals to drawing 4 , respectively. It is clear that the digital signal's [2nd] the 1st digital signal is reversed and the phase can be taken out from the 1st digital signal by continuing and changing to a half period. Output terminals A and B are connected to each input terminal of the circuit part CPIV. Although the digital signal which the circuit part CPIV functions as the "OR gate", therefore exists in the output terminal C has in "quantity" level any of the 1st or 2nd digital signal they are, in case other signals are in "low" level, it serves as "quantity" level. In all other condition, the digital signal which exists in an output terminal C is in "low" level. Curve C shows the time amount corresponding movement nature of the digital signal which exists in an output terminal C to drawing 4 . An output terminal C is connected to the input terminal of the circuit part CPV. Let this circuit part CPV be a "bistable multivibrator" or a "flip-flop." The digital signal which the digital signal which serves as "quantity" level between the sequential inclinations of the digital signal which exists in an output terminal C exists in the 1st output terminal D of the circuit part CPV, and exists in this output terminal C during this period changes from level to "low" "quantity" level. In case the digital signal which exists in an output terminal D is "low" level and "quantity" level, respectively, the digital signal set to "low" level and "quantity" level exists in the 2nd output terminal E of the circuit part CPVI. Curves D and E show the time amount corresponding movement nature of the digital signal which exists in the output terminals D and E of the circuit part CPV to drawing 4 , respectively. In order to connect an output terminal C to the control electrode of the switching element S6 of drawing 2 , in case the digital signal of an output terminal D is in a high level, a switching element S6 will be in switch-on. Therefore, the persistence time of a current pulse becomes equal to the time interval which has the digital signal of an output terminal D in a high level. The curve I of drawing 4 shows the time dependency of the amplitude of the total amount of the current which flows a high-pressure electric-discharge lamp in case this lamp operates by this invention high-pressure electric-discharge lamp lighting circuit. Although Curve I shows a lamp current as sine wave-like alternating current mostly, a current pulse is a rectangle-like mostly. A lamp current and the configuration of the both sides of a current pulse are not the summaries of this invention. In practice, the configuration of a current pulse can be made into the shape of the shape for example, of a sine wave, the shape of a triangular wave, and an exponential function.
The specific example of the high-pressure electric-discharge lamp lighting circuit shown in drawing 2 is Germany JP,3813412,B. It is used for actuation of the indicated high-pressure electric-discharge lamp. That nominal-electrical-power consumption is 100 W, and the electrode distance of this lamp is 1.4 mm. When mean amplitude superimposed the current pulse of 0.9 A on the lamp current in 8% (mean amplitude is [an alternation frequency] 90Hz in 1.1 A) after each half period, the flicker was able to be oppressed enough.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

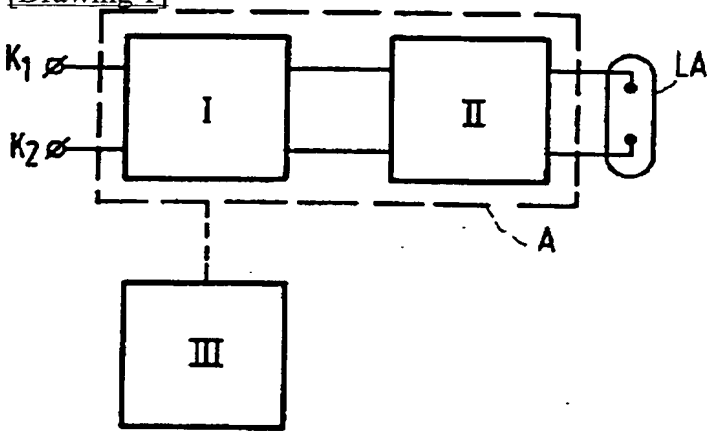

FIG.1

[Drawing 3]

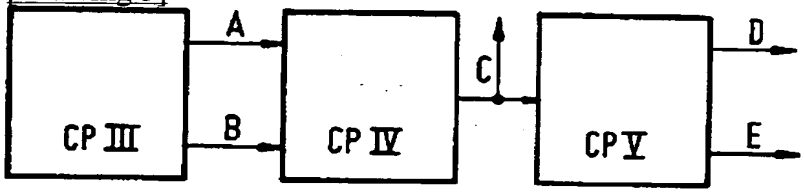

FIG.3

[Drawing 4]

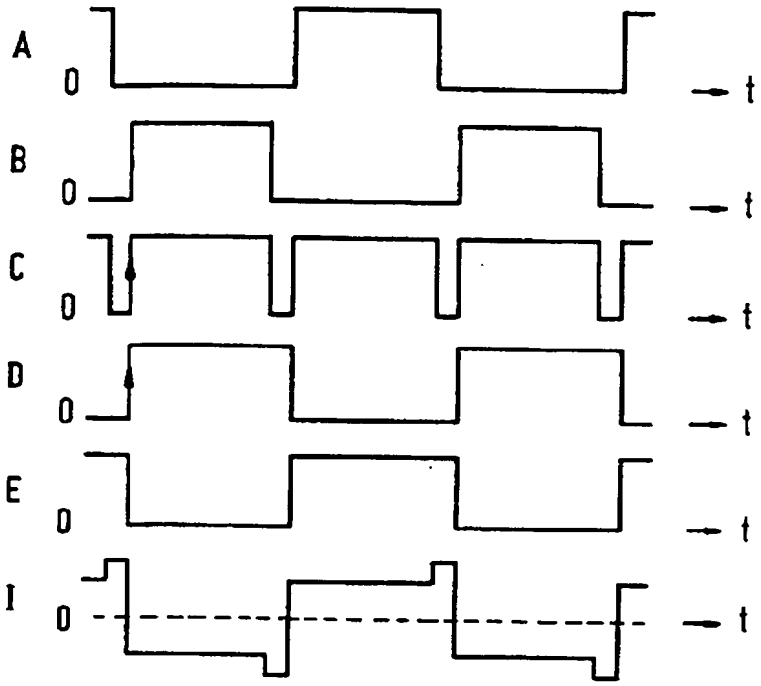

FIG.4

[Drawing 2]

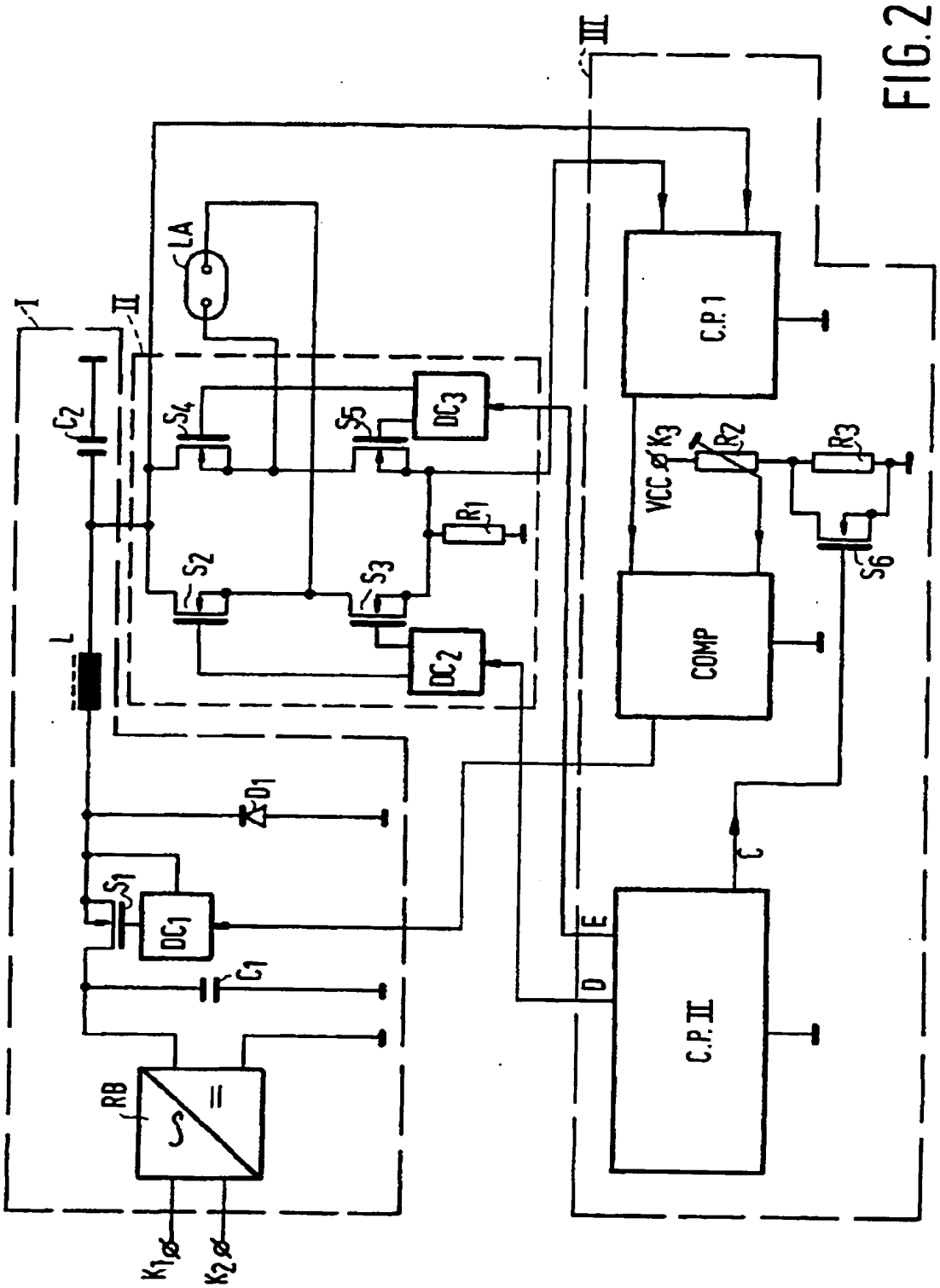

FIG.2

[Translation done.]